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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/761,193	JEONG ET AL.	
	Examiner	Art Unit	
	DAVID P. RASHID	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _12 May 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-15_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-15_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

[1] A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 12, 2008 has been entered.

Amendments

[2] This office action is responsive to the claim amendments received on March 10, 2008; and the applicant arguments filed on March 10, 2008 and March 18, 2008. Claims 1–15 remain pending.

Claim Rejections - 35 USC § 101

[3] In response to applicant's claim 35 USC § 101 rejections amendments and remarks received on May 12, 2008, the previous claim 35 USC § 101 rejections are withdrawn.

[1] Claims 1-13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The means-plus-function language is supported by possible <u>software/program enablement which is non-statutory </u>as it is inherent that the "multi-layered real-time stereo matching system" mean-plus-function language could be enabled by software/program enablement on the computer in the fig. 1 system.

Claim Rejections - 35 USC § 112

[4] The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

[5] The term "hardly affected" in claims 1-15 is a relative term which renders the claim indefinite. The term "hardly affected by imprecision…" amended by the claim does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Refer to the Response to Arguments section of this Office Action for further detail.

Claim Rejections - 35 USC § 102

[6] The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

[7] **Claims 1-2** and **14** are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pub. No. 2002/0012459 (published Jan. 31, 2002) [*hereinafter* "Oh"].

Regarding **claim 1**, *Oh* discloses a multi-layered real-time stereo matching system (fig. 9a; fig. 12) comprising:

a left and a right image acquisition means ("a camera for taking the scanning image…the other camera for taking the reference image" in ¶ 0004) for obtaining a left and a right image

("scanning image" and "reference image" in ¶ 0004) of an object ("object" in ¶ 0005) on a spatial area from different positions (¶ 0004);

an image processing unit (the unit responsible for creating the digital images as disclosed by *Oh*) for converting the left and the right image to a left and a right digital image (fig. 9 are digital images; ¶ 0001); and

a multi-layered image matching means (the processor responsible for execution of fig. 9b; "processor" in ¶ 0068), which includes a systolic array ("systolic array" in ¶ 0084; fig. 9; fig. 12), for comparing one scan line (R_1 in fig. 9b) in one of the left and the right digital image ("Reference Image" in fig. 9a) with multiple scan lines ($L_1 \ldots L_{64}$ in fig. 9b) in the other of the left and the right digital image ("Scanning Image" in fig. 9b) in real-time by using the systolic array so that each pixel in the one scan line matches another pixel in the multiple scan lines in the other digital image ("65th Calculation" in fig. 9b; ¶ 0084),

wherein said left and right digital images are left and right images of said object ("object" in ¶ 0005), and wherein matching the pixel in the one scan line with another pixel in the multiple scan lines enables location of the object in said spatial area so that the system is hardly affected by imprecision in location and direction of, or distortion caused by, said left and right image acquisition means (refer to the Response to Arguments section).

Regarding **claim 2**, *Oh* discloses the system of claim 1, wherein the multi-layered image matching means (the processor responsible for execution of fig. 9b; "processor" in ¶ 0068) receives pixels of the one scan line (R_1 in fig. 9b) in the one digital image sequentially and receives pixels of the multiple scan lines ($L_1 \ldots L_{64}$ in fig. 9b) in the other digital image at a time,

and calculates a disparity between one pixel in the one scan line and said another pixel in the multiple scan lines ("stereo disparity" in ¶ 0007).

Regarding **claim 14**, *Oh* discloses a multi-layered real-time stereo matching method (fig. 9b) , the method comprising the steps of:

(a) obtaining a left and a right digital image on a spatial area ("a camera for taking the scanning image…the other camera for taking the reference image" in ¶ 0004);

(b) comparing one scan line (R_1 in fig. 9b) in one digital image ("Reference Image" in fig. 9b) of the left and the right digital image with multiple scan lines ($L_1 \ldots L_{64}$ in fig. 9b) in the other digital image ("Scanning Image" in fig. 9b) in a real-time by using a systolic array ("systolic array" in ¶ 0084; fig. 9; fig. 12) to match each pixel in the one scan line with a pixel in the multiple scan lines ("65th Calculation" in fig. 9b; ¶ 0084),

wherein said left and right digital images are left and right images of said object ("object" in ¶ 0005), and wherein matching the pixel in the one scan line with another pixel in the multiple scan lines enables location of the object in said spatial area so that the system is hardly affected by imprecision in location and direction of, or distortion caused by, said left and right image acquisition means (refer to the Response to Arguments section).

Claim Rejections - 35 USC § 103

[8] The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[9] **Claims 3-5** and **7-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over *Oh* in view of U.S. Publication No. 2002/0025075 [published Feb. 28, 2002] [*hereinafter* "Jeong et al."].

Regarding **claim 3**, while *Oh* discloses the system of claim 2, and while *Oh* teaches wherein the multi-layered image matching means (the processor responsible for execution of fig. 9a; "processor" in ¶ 0068) includes: a plurality of layers (each layer being what has been calculated (e.g. "To 2nd Strip REG", "To 3rd Strip REG", and so forth)) for receiving the one scan line (R_1 in fig. 9b) in the one digital image ("Reference Image" in fig. 9b) and receiving the multiple scan lines ($L_1 \ldots L_{64}$ in fig. 9b) in the other digital image ("Scanning Image" in fig. 9b) one by one, *Oh* does not disclose wherein two adjacent layers exchange costs and active signals with each other; and an accumulator for accumulating data fed from the layers to generate the disparity.

Jeong et al. teaches wherein the multi-layered image matching means (fig. 1, element 13) includes:

wherein two adjacent layers (the two layers as input in fig. 4) exchange costs and active signals with each other (fig. 4, element 44; "matching cost based on a pair of pixels in one scan line of the first and second digital image signals" in ¶ 0009); and

an accumulator (fig. 4, element 43) for accumulating data fed from the layers to generate the disparity (output in fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the multi-layered image matching means and systolic array of *Oh* to include wherein two adjacent layers exchange costs and active signals with each other; and an

accumulator for accumulating data fed from the layers to generate the disparity as taught by *Jeong et al.* "to provide a real-time stereo image matching system which enables real-time stereo matching, by parallel processing video image sequences using an algorithm which is based on a new trellis based method and is optimal in the Bayesian sense.", *Jeong et al.*, ¶ [0008].

Regarding **claim 4**, while *Oh* in view of *Jeong et al.* discloses the system of claim 3, and while *Oh* discloses wherein each of the layers has: a first storing means (it is inherent if not already implicit that there must be a computer storage/memory of the image for it to be computed in fig. 9b) for storing pixels of the left digital image ("Reference Image" in fig. 9b); and a second storing means (it is inherent if not already implicit that there must be a computer storage/memory of the image for it to be computed in fig. 9b) for storing pixels of the right digital image ("Scanning Image" in fig. 9b), *Oh* does not disclose having a plurality of forward processors, stacks and backward processors for generating decision values and the disparity obtained from the left and the right digital image based on a clock signal.

Jeong et al. discloses a system for matching stereo image in real time (fig. 1) that includes wherein each scan line has:

a first storing means (fig. 1, element 12) for storing pixels of the left digital image ("Lin" in fig. 3);

a second storing means (fig. 1, element 12) for storing pixels of the right digital image ("Rin" in fig. 3); and

a forward processor (fig. 3, element 30), stack (fig. 3, element 31) and backward processor (fig. 3, element 32) for generating decision values ("decision value" in ¶ [0023]) and

the disparity (“disparity” in ¶ [0023]) obtained from the left and the right digital image based on a clock signal (“Clock” in fig. 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for each layer of *Oh* in view of *Jeong et al.* to include having a forward processor, stack and backward processor for generating decision values and the disparity obtained from the left and the right digital image based on a clock signal (thus a plurality of forward processors, stacks and backward processors for all layers) as taught by *Jeong et al.* “to provide a real-time stereo image matching system which enables real-time stereo matching, by parallel processing video image sequences using an algorithm which is based on a new trellis based method and is optimal in the Bayesian sense.”, *Jeong et al.*, ¶ [0008].

Regarding **claim 5**, while *Oh* in view of *Jeong et al.* disclose the system of claim 4, *Oh* does not teach wherein each of the forward processors of said each of the layers contains: a first multiplexor for determining a minimum cost among a recursive cost within said each of the forward processors and two costs fed from an upper and a lower layer of said each of the layers; a first cost register for storing the minimum cost; an absolute value calculator for calculating as a matching cost a difference between one of the pixels of the first image storing means and another pixel of the pixels of the second image storing means; a first adder for adding the matching cost to the minimum cost to generate a first added cost, a second multiplexor for deciding a minimum cost among the first added cost and two costs fed from an upper and a lower forward processor in said each of the layers; a second cost register for storing the minimum cost fed from the second multiplexor, wherein the minimum cost is fed back to the first cost multiplexor as the recursive cost and also provided to the upper and the lower layer; and a second adder for adding the

minimum cost stored in the second cost register to an occlusion cost to provide a second added cost to the upper and the lower forward processor.

Jeong et al. discloses a system for matching stereo image in real time (fig. 1) that includes wherein each of the forward processors (fig. 3, element 30; fig. 2, element 22) of each scan line contains:

a first multiplexor (fig.5, element 43) for determining a minimum cost among a recursive cost within said each of the forward processors and two costs fed from an upper and a lower layer of said each scan line (¶¶ [0025], [0027]);

a first cost register (fig. 4, element 44) for storing the minimum cost (¶ [0025]);

an absolute value calculator (fig. 4, element 41) for calculating as a matching cost a difference between one of the pixels of the first image storing means and another pixel of the pixels of the second image storing means (¶ [0025]);

a first adder (fig. 4, element 42) for adding the matching cost to the minimum cost to generate a first added cost (¶ [0025]),

a second multiplexor (fig. 4, element 43) for deciding a minimum cost among the first added cost and two costs ("Uin2" and "Uin1" in fig. 4) fed from an upper and a lower forward processor in said each of the layers (¶¶ [0045], [0046]);

a second cost register (fig. 4, element 44) for storing the minimum cost fed from the second multiplexor, wherein the minimum cost is fed back to the first cost multiplexor as the recursive cost and also provided to the upper and the lower layer (¶ [0047]); and

a second adder (fig. 4, element 42) for adding the minimum cost stored in the second cost register to an occlusion cost to provide a second added cost to the upper and the lower forward processor (¶ [0045]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for each layer of *Oh* in view of *Jeong et al.* to include wherein each of the forward processors of said each of the layers contains: a first multiplexor for determining a minimum cost among a recursive cost within said each of the forward processors and two costs fed from an upper and a lower layer of said each of the layers; a first cost register for storing the minimum cost; an absolute value calculator for calculating as a matching cost a difference between one of the pixels of the first image storing means and another pixel of the pixels of the second image storing means; a first adder for adding the matching cost to the minimum cost to generate a first added cost, a second multiplexor for deciding a minimum cost among the first added cost and two costs fed from an upper and a lower forward processor in said each of the layers; a second cost register for storing the minimum cost fed from the second multiplexor, wherein the minimum cost is fed back to the first cost multiplexor as the recursive cost and also provided to the upper and the lower layer; and a second adder for adding the minimum cost stored in the second cost register to an occlusion cost to provide a second added cost to the upper and the lower forward processor as taught by *Jeong et al.* "to provide a real-time stereo image matching system which enables real-time stereo matching, by parallel processing video image sequences using an algorithm which is based on a new trellis based method and is optimal in the Bayesian sense.", *Jeong et al.*, ¶ [0008].

Regarding **claim 7**, *Oh* discloses wherein each of the layers (each layer being what has been calculated (e.g. "To 2nd Strip REG", "To 3rd Strip REG", and so forth)) is inputted with pixels (the respective pixels in fig. 9b) of one scan line (R_1 in fig. 9b) of the one digital image ("Reference Image" in fig. 9b) and pixels (the respective pixels in fig. 9b) of multiple scan lines ($L_1 \ldots L_{64}$ in fig. 9b) of the other digital image ("Scanning Image" in fig. 9b).

Regarding **claim 8**, while *Oh* in view of *Jeong et al.* disclose the system of claim 5, *Oh* does not disclose wherein all the cost registers except a 0-th cost register in the forward processors in said each of the layers is initialized with maximum cost, respectively, and the second storing means is initialized based on the right digital image.

Jeong et al. discloses a system for matching stereo image in real time (fig. 1) that includes wherein all the cost registers except a 0-th cost register in the forward processors in said each of the layers is initialized with maximum cost, respectively, and the second storing means is initialized based on the right digital image (¶ [0039]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for each layer of *Oh* in view of *Jeong et al.* to include wherein all the cost registers except a 0-th cost register in the forward processors in said each of the layers is initialized with maximum cost, respectively, and the second storing means is initialized based on the right digital image as taught by *Jeong et al.* "to provide a real-time stereo image matching system which enables real-time stereo matching, by parallel processing video image sequences using an algorithm which is based on a new trellis based method and is optimal in the Bayesian sense.", *Jeong et al.*, ¶ [0008].

Regarding **claim 9**, while *Oh* in view of *Jeong et al.* disclose the system of claim 5, *Oh* does not teach wherein,

if a sum of a processing element number and a forward processing step number is an even number, said each of the forward processors decides a minimum cost among the recursive cost and two added costs obtained by adding the occlusion cost to said two costs fed from the upper and the lower forward processor in said each of the layers, respectively, to provide the minimum cost as a first decision value to a stack,

and, if otherwise, said each of the forward processors determines another minimum cost among a cost obtained by adding an absolute pixel difference of the left and the right digital image to the first decision value and two costs of two forward processors of the upper and the lower layer to provide the minimum cost as a second decision value to the stack.

Jeong et al. discloses a system for matching stereo image in real time (fig. 1) that includes wherein

if a sum of a processing element number and a forward processing step number is an even number, said each of the forward processors decides a minimum cost among the recursive cost and two added costs obtained by adding the occlusion cost to said two costs fed from the upper and the lower forward processor in said each of the layers, respectively, to provide the minimum cost as a first decision value to a stack (¶¶ [0036], [0037]; "If i + j is even" and its full condition in ¶ [0063]),

and, if otherwise, said each of the forward processors determines another minimum cost among a cost obtained by adding an absolute pixel difference of the left and the right digital image to the first decision value and two costs of two forward processors of the upper and the

lower layer to provide the minimum cost as a second decision value to the stack (¶¶ [0036], [0037]; "If i + j is odd" and its full condition in ¶ [0063]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for each layer of *Oh* in view of *Jeong et al.* to include wherein, if a sum of a processing element number and a forward processing step number is an even number, said each of the forward processors decides a minimum cost among the recursive cost and two added costs obtained by adding the occlusion cost to said two costs fed from the upper and the lower forward processor in said each of the layers, respectively, to provide the minimum cost as a first decision value to a stack, and, if otherwise, said each of the forward processors determines another minimum cost among a cost obtained by adding an absolute pixel difference of the left and the right digital image to the first decision value and two costs of two forward processors of the upper and the lower layer to provide the minimum cost as a second decision value to the stack as taught by *Jeong et al.* "to provide a real-time stereo image matching system which enables real-time stereo matching, by parallel processing video image sequences using an algorithm which is based on a new trellis based method and is optimal in the Bayesian sense.", *Jeong et al.*, ¶ [0008].

[10] **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over *Oh* in view of U.S. Patent No. 5,867,591 (issued Feb. 2, 1999) [*hereinafter* "Onda"].

Regarding **claim 15**, while *Oh* discloses the system of claim 14, *Oh* does not disclose wherein the step (b) includes the steps of: (b1) determining a path of a minimum cost as a decision value based on pixel data of the one scan line and pixel data of the multiple scan lines;

(b2) calculating a disparity from the decision value; and (b3) using the disparity to find a pair of pixels from the left and the right digital image and calculating a distance from the disparity.

Onda discloses wherein the step (b) includes the steps of:

(b1) determining a path of a minimum cost as a decision value ("disp1" and "disp2" in fig. 18; 14:23-31) based on pixel data of the one scan line (pixels in "left window TLk(x,y)" in fig. 17) and pixel data of the multiple scan lines (pixels in "right window TRk(x,y)" in fig. 17; right window in fig. 16, element TR1; 6:29-40);

(b2) calculating a disparity ("identify most-frequent-valued block as true disparity" in fig. 19; Col. 15, lines 35 – 51) from the decision value; and

(b3) using the disparity to find a pair of pixels from the left and the right digital image and calculating a distance from the disparity (once the block disparity is found, the distance between the right and left windows is itself "disp" as shown in fig. 16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for step (b) of *Oh* to include the steps of: (b1) determining a path of a minimum cost as a decision value based on pixel data of the one scan line and pixel data of the multiple scan lines; (b2) calculating a disparity from the decision value; and (b3) using the disparity to find a pair of pixels from the left and the right digital image and calculating a distance from the disparity as taught by *Onda* "to provide a method of matching stereo images and of detecting disparity between these images, small in the volume of computations, compact in the hardware construction, quick in processing, highly reliable, and excellent in accuracy.", *Onda*, 4:57-61.

Response to Arguments

[11] Applicant's arguments filed on March 10, 2008 and March 18, 2008 with respect to **claims 1-15** have been respectfully and fully considered, but they are not found persuasive.

Summary of Remarks regarding **claims 1-15**:

Applicant argues that the purpose of matching pixels using a systolic array, as claimed, between one scan line and multiple scan lines, is to ensure that when the image matching means fails to locate a corresponding pixel L(x,y) in a scan line y, it will continue to search several scan lines given by y+a, wherein a ranges from -n/2 to n/2 (to obtain L(x+d,y+a), $a \in [-n/2,n/2]$. The image matching means disclosed in the Oh publication has no such capability. It merely searches line y, rather than line y+a, $a \in [-n/2,n/2]$. Therefore, if the left and fight cameras are not placed properly or are subject to distortion, and the searched scan line given by y does not contain a match, then Oh cannot find a matching pixel. (Applicant Resp. at 8, Mar. 10, 2008.)

The Jeong publication and Onda publication, like the Oh publication, fails to disclose or suggest matching of each pixel in one scan line with another pixel in multiple scan lines using a systolic array. (Resp. at 9.)

Furthermore, Applicants show the results of an experiment which compares the stereo image matching system in accordance with the present invention with a stereo image matching system in which each pixel in the one scan line matches another pixel in the single scan line in the other digital image in a same manner as described in the Oh publication when one camera axis is rotated slightly, or one input image is slightly zoomed. (Applicant Resp. at 2, Mar. 18, 2008.)

As shown in Figs. 2 and 3 (Resp. at 2-3), when one camera axis is slightly rotated or one input image is slightly zoomed, the present invention has much smaller errors compared to the prior system. The present invention doesn't need any prior camera calibration information for stereo matching. Therefore, the positively recited feature of matching each pixel in one scan line with pixels in multiple scan lines results in a noticeable improvement in output image quality, providing further evidence of the substantial differences between the claimed method and the method described in the Oh patent. (Resp. at 3.)

Examiner's Response regarding **claim 1-15**:

Applicant's arguments with respect to the claim amendments are unpersuasive on the grounds that as the newly added limitation "so that the system is hardly affected by imprecision…" (*emphasis added*) does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

In re Chandler, 117 U.S.P.Q. (BNA) 361 (C.C.P.A. 1958) held that a "means [plus function]...so that..." clause is proper and patentable where the sole point of novelty follows the expression "so that." The court stated,

> We are of the opinion that the expression beginning with "so that" is not merely functional, but constitutes a part of the definition of the "means responsive to said movement." . . . Such a definition conforms to the provision of 35 U.S.C. section 112 that an element in a claim for a combination "may be expressed as a means or step for performing a specified function without the recital of structure, material or acts in support thereof." The instant situation differs from that presented in *In re Lamb* [64 U.S.P.Q. 241

> (C.C.P.A. 1944)]. There the "whereby" clause did not constitute a part of the definition of any means but merely stated a function which did not necessarily follow from the apparatus recited in the claim.

The claim in question read:

> . . . and <u>means</u> responsive to said movement <u>for regulating</u> the propulsive power of said engine, in accordance with said movement, <u>so that</u> said aircraft is propelled at a definite, selected speed, corresponding to the position of said engine relative to said aircraft, throughout the speed range of said aircraft. *In re Chandler* at 361 (*emphasis added*).

However, though the Examiner believes that the functional clause "so that" is plausible in light of *In re Chandler*, the usage of "so that the system is <u>hardly affected</u> by imprecision…" (*emphasis added*) is highly indefinite and subjective. It is unclear what degree of objectivity/functionality accompanies whether a system is being "hardly affected by imprecision..." or not. The Examiner can say <u>so long as the system does not in itself "crash and falter"</u> in the presence of "imprecision in location and direction of, or distortion caused by, said left and right image acquisition means" is enough for the system to be "hardly affected by [the] imprecision". Under this interpretation, *Oh* anticipates the claim amendments in that the system of *Oh* does not "crash and falter" in the presence of "imprecision in location and direction of, or distortion caused by, said left and right image acquisition means", so that the system must be "hardly affected by [such] imprecision".

Furthermore, "means...so that said aircraft is propelled at a definite, selected speed, corresponding to the position of said engine relative to said aircraft, throughout the speed range of said aircraft (*In re Chandler* at 361) is definite in that there must exists "a definite, selected

speed…throughout [a] speed range.” It is clear to the Examiner that there must exist a speed, that speed definite through a speed range. However, being “hardly affected by imprecision…” does not provide enough definiteness. The Examiner suggests incorporating more definiteness from the original disclosure to define solid characteristics that in consequence (and distinguish from the prior art of record) make the system “hardly affected by imprecision”.

Conclusion

[12] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5383013 A; US 5719954 A; US 5825915 A; US 6046763 A; US 6125198 A; US 6215898 B1; US 6373518 B1; US 20040228521 A1.

[13] Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached Monday - Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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